

The First Meeting of ILC Magnet System TG
25 - 26 April, 2006

Status of Asian Group

R. Sugahara

KEK

- **Normal conducting magnets**

KEK + IHEP

- KEK group fabricated about 1,600 main magnets including 154 wiggler magnets, and about 1,700 steering magnets in the construction of KEKB
- IHEP has enough experience through the magnet production for SPEAR3 and PEP-II (SLAC), BEPC-II (IHEP) and ATF2 (KEK)
- KEK will consult one or two Japanese major magnet makers such as Hitachi, Toshiba, Mitsubishi Electric and Sumitomo Heavy Industries on detailed designing and costing

- **Superconducting magnets**

- Kiyosumi Tsuchiya and Norihito Ohuchi are in charge of the fabrication of cryomodules for STF (Super conducting RF Test Facility at KEK)
- Although no SC quads are installed at phase 1, they are thinking to install them at phase 2
- K. Tsuchiya has an opinion that we should fabricate SC quads stand alone and test them precisely because it will be difficult to do such precision test with SC quads installed in about 13m long cryostat together with RF cavities
--> See the tolerances for ML quads

Specification for Main Linac Quadrupoles was presented by N.Solyak in the RDR video meeting on April 18, 2006

Quad (N=630 if 1Q/3CM):

Dimensions:

- Beam pipe diameter 78 mm
- Quad total length ~ 600mm

•**Integrated gradient:** (scale with energy, max 90° phase advance, if L=0.66 m)

- 1Q/4CM lattice at 250 GeV: $B' \cdot L < 26 \text{ T}$ ($B' < 40 \text{ T/m}$)
- 1Q/3CM lattice at 250 GeV: $B' \cdot L < 36 \text{ T}$ ($B' < 54 \text{ T/m}$) - proposal

•**Max current:** (at 250 GeV) = 100A

•**Stability:** faster than orbit correction (<1 ms) < 2.E-5

•**Stability:** slower than orbit correction (>0.2 s) < 2.E-3

•**Higher harmonic tolerance:** not yet studied

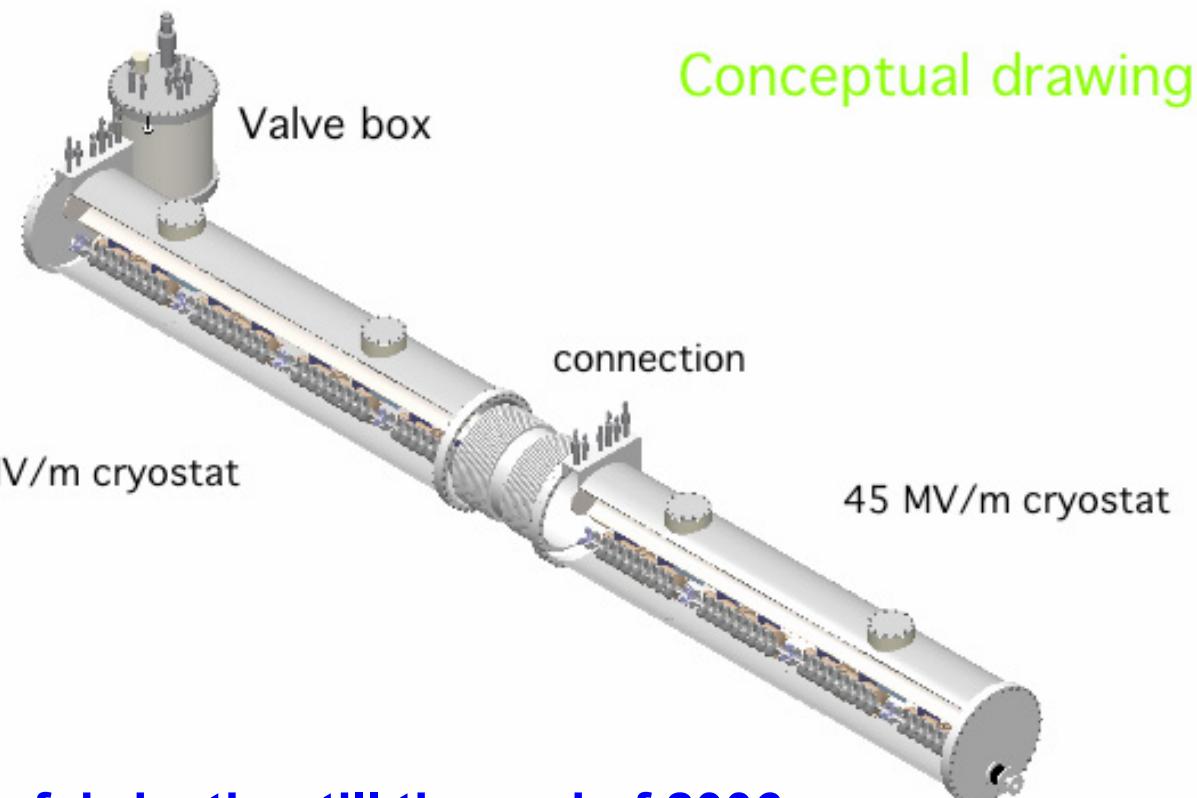
TESLA TDR (reference): Skew quad < 3.e-4; High harmonics < 1.e-3 (at 5mm)

•Alignment tolerances:

- Position:** 0.3 mm rms
- Roll:** angle < 0.3 mrad rms (<0.1 mrad in TESLA TDR)
- Tight tolerances (~5um at r=50mm for 0.1mrad), needs built-in skew correctors(?)
- Pitch, yaw** < 0.1mrad;

STF phase 1 cryostat

two 5m long cryostats for 35 and 45 MV/m cavities



- Complete fabrication till the end of 2006
- Start fabrication two full size modules in the beginning of 2007
(Phase 2)

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- Specification for low carbon steel
(for block type magnets)

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- Specification for silicon steel
(for lamination type magnets)

$B_{50} > 1.6\text{T}$ and $\Delta B_{50}/B_{50} < \pm 1\%$

$H_c^{1.5} < 70 \text{ A/m}$ and $\Delta H_c^{1.5}/H_c^{1.5} < \pm 5\%$

where

B_{50} --> flux density at $H=5000 \text{ A/m}$

$H_c^{1.5}$ --> coercive force in the excitation at $B=1.5\text{T}$

Kind of magnets

- Normal conductive magnets
- Superconductive magnets in ML
- Special magnets
 - SC Wigglers in DR
 - Solenoids in e+ source
 - Kickers
 - Septum magnets
 - IR FF magnets in BDS
 - Long weak bends in BDS

Responsibility of Magnet System TG

- Magnets
- Supports
- Movers
- Power supplies
- Cables + cable trays
- Interface to control system (including interlock signals)
- Beam pipes for
 - ML cold magnets
 - Kickers
 - Septums
 - Some IR magnets

Buildings/huts necessary for Magnet System TG

- To receive magnets
 - > What is the schedule for production, field measurement and installation?
How many magnets we have to stock at one time?
We have 7 years for the construction

PPPPPbb	production
bFFFFFb	field measurement
bbAAAAAA	installation and alignment
- For field measurement
 - Warm magnets
 - > Do we measure all magnets?
 - Cold magnets
 - > Will be done in the the cryogenic building
- Cryogenic building to handle cold magnets
- For R&D of magnets
 - > Each group of special magnets lists up their requisition

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FFTB Magnets (Dipoles, Quads and Sextupoles)

Cores

- Cross section (esp. coil slot and bore dia.)
- Side view (esp. length of core)

Coils

- Cross section of conductor (size and hole dia.)
- Number of turns and total length of coil

Operation

- Max. current
- $L_{\text{effective}}$

Cooling water

- ΔP and P at inlet